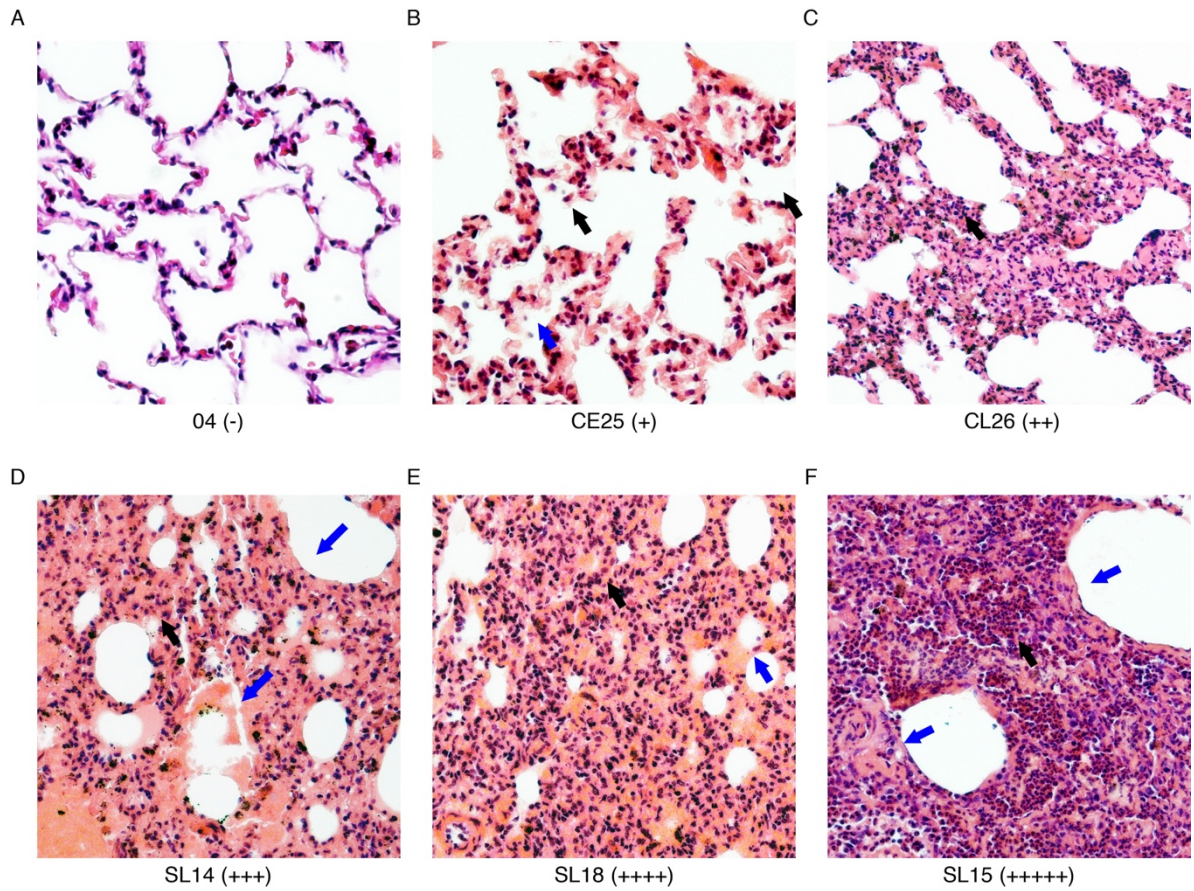
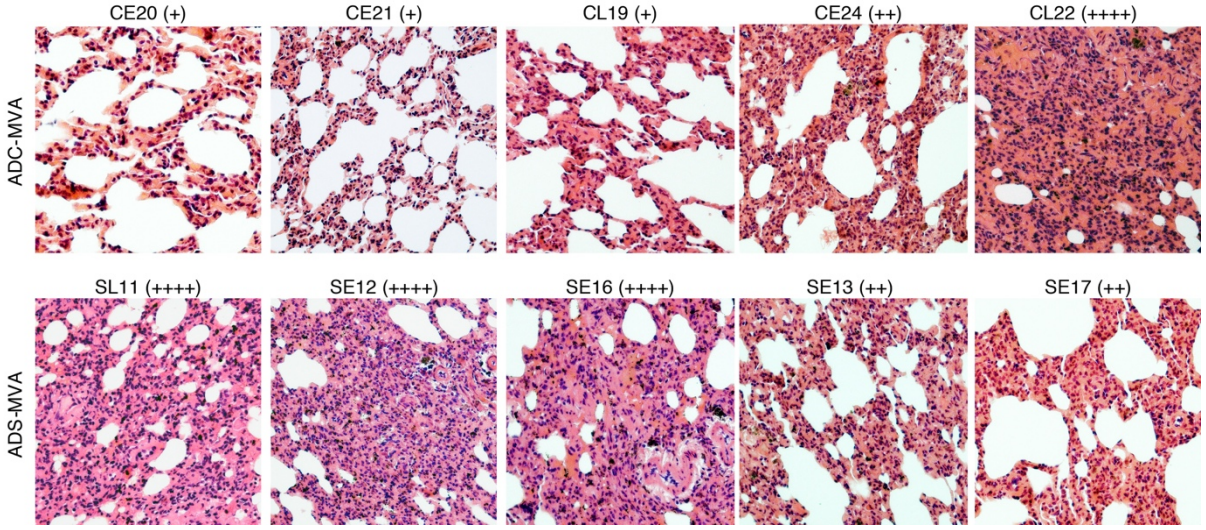
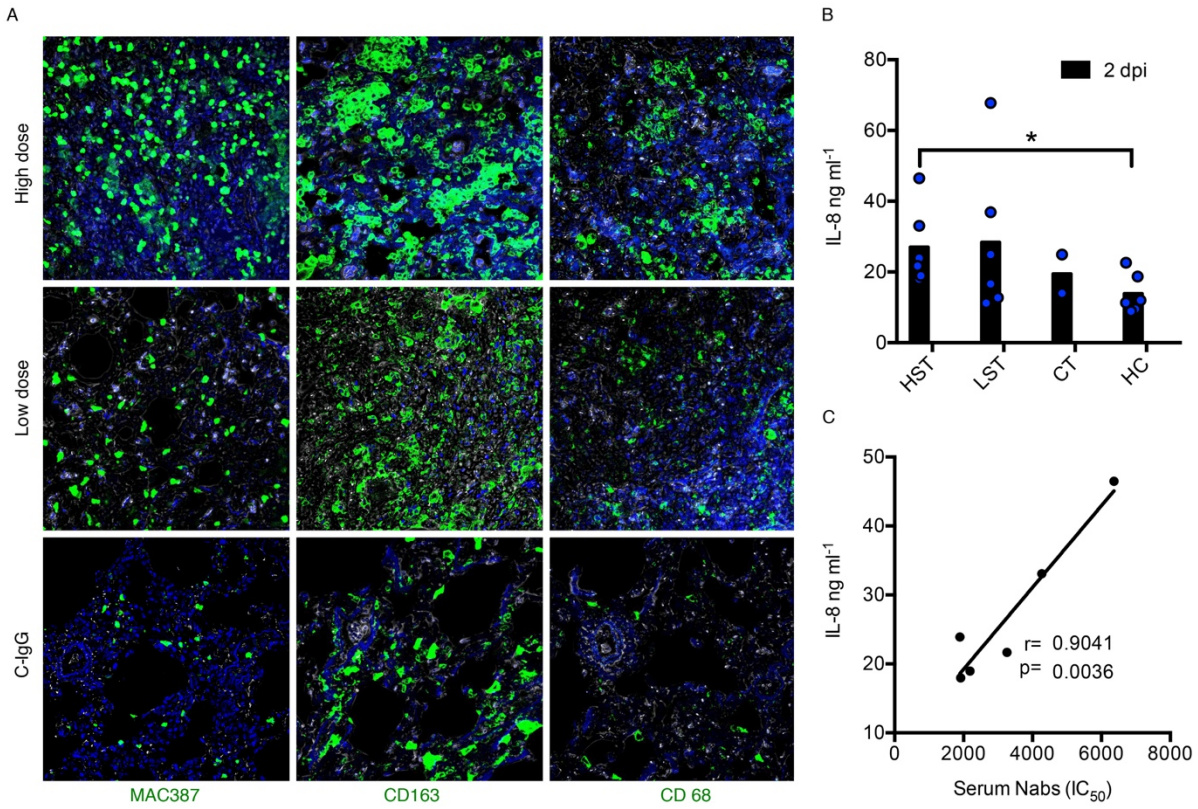


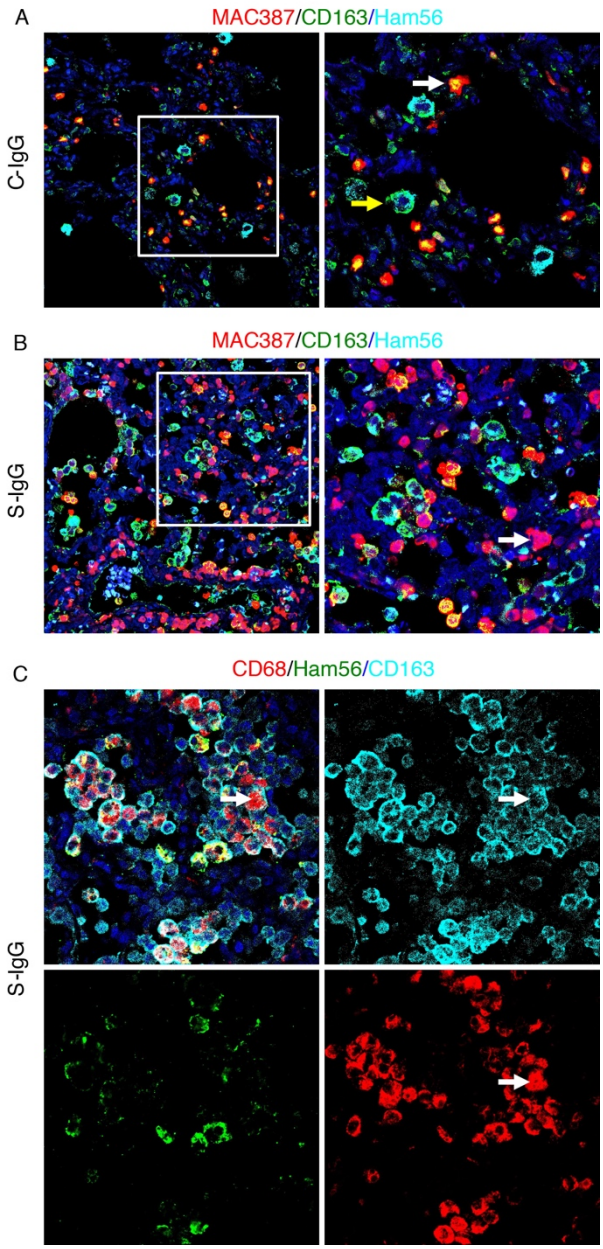
Supplemental figure 1. Severity of lung histopathology in SARS-CoV-challenged macaques. All lung histology sections were stained with H&E (original magnification, 100). A. Normal lung section from macaque #04 without SARS-CoV infection ‘‘-/0’’. B. Minor inflammation ‘‘+/1’’, from control vaccine treated macaque # CE25, with slight broadening of alveolar septa (blue arrow) and sparse monocyte infiltration (black arrow). C. Apparent inflammation ‘‘++/2’’, from control vaccine treated macaque #CL26, alveolus septa broadening with more interstitial mononuclear inflammatory infiltration (black arrow). D. Early symptom of acute DAD ‘‘+++/3’’, from ADS-MVA vaccine treated macaque # SL14, with alveolus septa broadening, and increased infiltration of inflammatory cells (black arrow). An exudation and some hyaline membranes lining the alveolar walls are present (blue arrows). E. Typical symptom of acute DAD ‘‘++++/4’’, from ADS-MVA vaccine treated macaque #SL18, with extensive exudation and septa broadening (blue arrow), shrinking of alveoli caused by pressure, restricted fusion of the thick septa, obvious septa hemorrhage and more cell infiltration in alveolar cavities (black arrow). F. Severe acute DAD ‘‘+++++/5’’, from ADS-MVA vaccine treated macaque #SL15 (image reuse of figure 1D), with massive cell filtration in alveolar cavities and alveoli shrinking (black arrow), sheets of septa fusion, and hyaline membranes lining the alveolar walls (blue arrow).



Supplemental figure 2. Lung histopathology in SARS-CoV-challenged macaques. These tissue sections were stained with H&E (original magnification, 100). Upper panel shows lung histopathology of five macaques from ADS-MVA group. Lower panel shows lung histopathology of five macaques from control group. Typical symptom of acute DAD ‘‘++++/4’’ were observed from ADS-MVA vaccine treated macaque #SL11, SE12, SE16, and control vaccinated macaque CL22. Other macaques exhibited minor (+) to moderate inflammation (++).



Supplemental figure 3. Enhanced inflammation and accumulation of IMMs in the lungs of S-IgG treated macaques during acute infection. A. Enhanced accumulation of IMMs in the lungs of S-IgG treated macaques. These lung sections were immunostained with antibodies for macrophages (MAC387, CD163 or CD68, FITC). A shows more robust signals for all three monocytes/macrophage markers in the lungs of high- and low-dose S-IgG treated macaques compared with the C-IgG group. B. Increased serum level of IL-8 in S-IgG treated macaques during acute infection. C. IL-8 serum level correlates with sera Nabs titers in high dose S-IgG group.



Supplemental figure 4. Further analysis of the phenotypes of IMMs in the lungs of C-IgG- and S-IgG-treated macaques. These sections were triple-immunostained with MAC387 (TRITC), CD163 (FITC) and Ham56 (cyan) (A and B), or CD68 (TRITC), ham56 (FITC) and CD163 (cyan) (C). A shows that resident alveolar macrophages are activated. They are $CD163^{+}ham56^{+}$, and are bigger in size (yellow arrow). Most $MAC387^{+}$ recently infiltrated monocytes/macrophages co-expressed CD163, and are $ham56^{-}$ (white arrow). B shows increased number of $MAC387^{+}$ recently infiltrated monocytes/macrophages in S-IgG-treated macaques. Half numbers of them do not co-express CD163 (white arrow) and are $ham56^{-}$, likely represent newly infiltrated monocytes. C shows distinct phenotype of $CD163^{+}$ IMMs in the S-IgG group. Unlike $CD163^{+}$ IMMs in C-IgG group, which are mostly $CD68^{-}$, $CD163^{+}$ IMMs in S-IgG group co-expressed CD68.

Supplemental Table 1. Nab titers in plasma and viral RNA detection in swabs and lung tissue homogenates from Chinese macaques after passive transfer of ADS-MVA or ADC-MVA induced IgG and challenge with SARS-CoV

Macaques ID	Nab titer	Viral	RT-PCR at day [c]			
	(IC50)[a]	Isolation [b]	2	5	7	21
High dose						
HS01	6363	−	−	/	/	/
HS02	1896	+	−	/	/	/
HS03	1914	−	3.685×10^{2}	/	/	/
HS04	2186	−	−	−	−	−
HS05	3259	−	−	−	−	−
HS06	4272	−	−	−	−	−
Low dose						
LS07	69.35	+	7.642×10^{3}	/	/	/
LS08	58.26	+	−	/	/	/
LS09	29.68	+	−	/	/	/
LS10	72.1	−	1.526×10^{2}	1.032×10^{2}	−	−
LS11	276.9	−	−	−	−	−
LS12	28.34	−	−	−	2.365×10^{2}	−
Control						
C13	−	+	3.458×10^{2}	/	/	/
C14	−	−	1.852×10^{2}	−	5.213×10^{1}	−

a Neutralizing antibodies titer in plasma were detected at 2 dpi after the viral inoculation. Nab, neutralizing antibody.

b Virus isolation was performed by using lung tissue homogenates. +, positive either at day 2 or 7; -, negative.

c RT-PCR was performed on nasopharyngeal swab specimens., positive; -, negative.

Supplemental Table 2. Histopathological scores of the lungs from Chinese macaques after passive transfer of S-IgG and challenge with SARS-CoV

Macaques ID		Lung pathology by H&E staining [a]						
		Left cranial lobes	Left middle lobes	Left caudal lobes	Right cranial lobes	Right middle lobes	Right caudal lobes	Right accessory lobe
High dose								
Day 2	HS01	++++	+++	+++	+++	++	+++	+++
	HS02	+++	++	+++	++++	+++	+++++	++++
	HS03	++	+++	++	+++	+++	+++	++++
Day 21	HS04	++	+++	+++	++++	+++	+++	++++
	HS05	+++	+++	+++	++	+++	+++	+++
	HS06	+++++	++++	++++	++++	+++++	++++	++++
Low dose								
Day 2	LS07	+++	++	+++	+++	+++	++++	+++++
	LS08	++	+++	+++	+++	++++	+++	+++
	LS09	++++	++++	++++	++++	+++	++++	+++
Day 21	LS10	++++	++++	++++	++++	++++	++++	++++
	LS11	++++	++++	++++	+++	+++	+++++	++++
	LS12	+++++	+++++	++++	+++++	++++	++++	++++
Control								
Day 2	C13	+	-	+	+	++	-	+
Day 21	C14	+	++	+	+	+++	++	++

H&E was performed on lung tissue specimens. The severity of the lung damage was defined using six-grade scoring system from least severe to most severe, and recorded as: (0) ‘‘-’’, (1) ‘‘+’’, (2) ‘‘++’’, (3) ‘‘+++’’, (4) ‘‘++++’’ and (5) ‘‘+++++’’. See supplemental figure 1 for the scoring index based on severity of lung histopathology.

Supplemental Table 3. Detection of SARS-CoV NP and RNA in the lung of Chinese macaques after passive transfer of ADS-MVA induced IgG and challenge with SARS-CoV

Macaques ID		SARS-CoV Nucleoprotein by IHC[a] and RNA by ISH [b]						
		Left cranial lobes	Left middle lobes	Left caudal lobes	Right cranial lobes	Right middle lobes	Right caudal lobes	Right accessory lobes
High dose								
Day 2	HS01	++	++	++	++	++	++	++
	HS02	++	++++	+++	+/ISH$^+$	+++	++	+++
	HS03	++	++	+	++	+	++	++
Day 21	HS04	+	+	+	+	+	+	+
	HS05	+	+	++	++	+	+	+
	HS06	+	++	+	+	+	+	+
Low dose								
Day 2	LS07	++	+++/ISH$^+$	+++/ISH$^+$	++	+	+	+
	LS08	++	+	++/ISH$^+$	+	++/ISH$^+$	++	++
	LS09	+	+	+	+	++	+	+
Day 21	LS10	++	+	++	++	+	+	+
	LS11	+	+	+	+	+	+	++
	LS12	+	+	+	+	++	+	+
Control								
Day 2	C13	++	++	+	+++/ISH$^+$	+	+	+
Day 21	C14	+	+	-	+	+	+	+

a. IHC was performed on lung tissue specimens. The fluorescence (pixel) intensity of SARS-CoV N protein (GFP+) and DAPI nucleic acid (Blue+) stain was calculated in two to four high-power views (200×). The GFP+/Blue+ ratio of mean fluorescence intensity per unit area 0%, 1 to <24%, ≥25% to <49%, ≥50% to <74%, and ≥75% was recorded as '−', '+', '++', '+++', and '++++', respectively.

b. ISH was performed on lung tissue specimens. Tissue samples positive for viral RNA were indicated as ISH$^+$. The remaining tissues samples are negative for viral RNA.

Supplemental Table 4. Detection of neutralizing activity, SARS-CoV productive infection in respiratory mucosal and Hilar lymph nodes, and pathology of the lung of Chinese macaques

		SARS-CoV Infection				**Nab** [d]	**Lung pathology** [e]
		Viral RNA		NP [c]			
		Oral swab [a]	lung [b]	Lungs	Hilar lymph nodes		
Day 2	AD0505	-	-	+	+	-	+
	AD0506	+++	+++/ISH$^+$	+++	+	-	++
	AD0507	+++	-	+	+++	-	+
	AD0508	+++	+++/ISH$^+$	+++	++	-	++
Day 3	AD0510	++	-	+	+	-	+
	AD0511	++	-	+	+	-	+
	AD0512	++	-	+	+	-	+
	AD0513	++	++	++	+	-	++
Day 7	AD0515	-	-	-	++	+	-
	AD0516	++	+++	+	+	++	+++
	AD0517	++++	-	+	+++	-	+
	AD0518	+++	-/ISH$^+$	+++	+	-	++

a RT-PCR was performed on oral swab specimens collected at the days of sacrifice. The results were quantified as follows: no detectable viral RNA= negative; 10^2 to 10^3 RNA copy/ml = 2 +; 10^3 to 10^4 RNA copy/ml = 3 +; greater than 10^4 RNA copy/ml = 4 +.

b Productive infection in the lungs were determined by either virus isolation using lung tissue homogenates or ISH using paraffin fixed tissue samples. The results of virus isolation were quantified as follows: no detectable viral RNA= negative; 10^2 to 10^3 RNA copy/ml = ++; 10^3 to 10^4 RNA copy/ml = +++. Tissue samples that are positive for viral RNA by ISH were indicated as ISH$^+$. The rest of the tissues samples are negative for ISH.

c Tissue samples were tested for SARS-CoV Nucleoprotein by IHC. The results of the stain of SARS-CoV protein were quantified as follows: no positive cells = negative; one to 10 positive cells per section = 1 +; 10 to 50 positive cells per 10 x field = 2+; greater than 50 positive cells per 10 x field = 3+.

d Neutralizing antibodies were detected when the animals were sacrificed. Nab, neutralizing antibody.

e H&E was performed on lung tissue specimens. The severity of the lung damage was defined using six-grade scoring system ranging from least severe to most severe: (0) ‘‘-’’, (1) ‘‘+’’, (2) ‘‘++’’, (3) ‘‘+++’’, (4) ‘‘++++’’ and (5) ‘‘+++++’’.

Supplemental Table 5. Profile of cases

Serum ID	Case ID Number	Sex	Age	Date of serum collection	Days from symptom onset to sera collection	SARS status	Nabs (IC50)
D1	706801	F	37	14-Apr-03	23	Dead	21438
D2	65652	M	65	08-Apr-03	14	Dead	3443
D3	700678	M	40	12-Apr-03	24	Dead	33709
D4	653116	M	41	07-Apr-03	20	Dead	152251
D5	553388	M	80	19-Mar-03	8	Dead	7429
D6	548348	F	32	26-Mar-03	23	Dead	14261
R1	824057	M	42	03-May-03	Early stage	Recovered	20511
R2	893608	F	34	13-May-03	Early stage	Recovered	24757
R3	815958	F	28	02-May-03	Early stage	Recovered	1772
R4	808978	M	35	30-Apr-03	Early stage	Recovered	20336
R5	878427	M	63	03-May-03	Early stage	Recovered	4411
R6	763532	F	24	24-Apr-03	Early stage	Recovered	8905
R7	896175	F	27	14-May-03	Early stage	Recovered	1688
R8	877220	M	50	12-May-03	Early stage	Recovered	1873